DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

PROBLEMS OF PROGRESS IN INDUSTRY—13

THE SUPERVISOR AND HIS JOB

by

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1963

PREFACE

The object of this series is to present briefly and simply the results of new research into the economic, technical and human problems of industrial progress—problems arising from automation and other advances in techniques and problems of management and social relations.

The series is commissioned and edited by the Department of Scientific and Industrial Research, which seeks to provide a forum for responsible new thinking and to stimulate independent discussion and action, including future research. The conclusions are those of the investigators, mostly from the universities and other well-known research bodies.

This booklet is an interim report on a research project on 'Systems of Supervision' which is sponsored by the Department and carried out by a team from the London School of Economics over a five-year period from 1959 to 1963. Its purpose is to isolate and measure the tasks that are being performed by shop-floor supervisors in a variety of industries: to discover how much variation, and how much common ground, there is between the jobs of supervisors in different situations; to attempt to account for these variations; and to reach conclusions on the implications of these findings on the organization of supervisory systems and the selection and training of supervisors.

Of the five case-studies discussed in this booklet four were conducted by K. E. Thurley, A. C. Hamblin and Miss C. P. Dickinson of the London School of Economics under the supervision of Miss B. N. Seear and J. H. Smith and one (using very similar methods) by J. E. T. Eldridge of the Staffordshire College of Commerce.

The present booklet should be seen not as a detailed report on the results of the case-studies, but as a discussion of these results and their implications. The LSE has stated that it will publish a full report on the research at a later date.

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I. THE STUDY

INTRODUCTION

How much is known about the supervisor's job? Many books and articles have been written about the principles of supervision, the techniques of leadership, and so on; yet very little is generally known about the actual tasks performed by supervisors in industry, and the pattern of activities which make up a supervisor's day.

It is widely assumed that the supervisor's job is basically the same in most industries and that the same principles of selection, training and organization can always be applied. Yet this assumption is a dangerous one if it is not supported by detailed knowledge of supervisory jobs. It could, for instance, lead to serious misconceptions about the training needs of particular supervisors, or to attempts to impose upon a firm a pattern of organization which would be more appropriate to a different section of industry.

The idea that supervisors' jobs might, in fact, vary considerably between firms and industries, was given strong support by Miss Joan Woodward in her booklet* in which she claimed that different 'technologies' or production systems (unit and small batch, large batch and mass, and process production) have their own distinctive types of organization and patterns of management decision-making.

One of the main aims of the LSE research has been, therefore, to discover how much common ground there is between supervisory jobs in contrasting industries. Limited time and resources made it possible to study only a small number of firms, but these have been deliberately chosen to show contrast rather than similarity.

The five firms covered were: Packaging Ltd. and Engineering Ltd. (small batch production); Footwear Ltd. (large batch production); Electronics Ltd. (mass production); and Brewing Ltd. (process-batch production).

The jobs of selected production supervisors in these firms were studied by methods outlined in Appendix I.

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*Joan Woodward. Management and Technology. *Problems of Progress in Industry*, No. 3, (DSIR) HMSO, 1958.

Details of the number of departments, levels of supervision, and individual supervisors, covered in the various firms, together with other organizational details, will be found in Appendix II.

WHAT IS A SUPERVISOR?

The definition of 'supervisor' used in this study is based on the theory that the purpose of management is to *control* the operatives and operations on the shop-floor. This control can be exercised in two ways: first, by administrative methods, i.e. at a distance; and secondly, by actual 'overseeing', inspection and direction in the area of operations. A 'supervisor' (as distinct from a purely administrative manager) is someone who exercises control by the latter method.

Within this definition three distinct levels of authority were distinguished, all of which were present in most of the firms studied:

(i) The *second-line supervisor* (called supervisor, foreman, senior foreman or shift engineer), directing the supervisory system and linking it with higher management.

(ii) The *first-line supervisor* (chargehand or foreman) i.e. the man who is regarded by the operatives as their 'immediate boss' and who possesses direct and undisputed formal authority over them.

(iii) The *semi-supervisor* (leading toolsetter, senior process man, head girl or technical assistant), combining supervisory with operative duties and possessing more informal than formal authority.

In this short booklet, the discussion is confined mainly to the job of the 'first-line supervisor' in *production* departments. The main conclusions will first be summarized, and then discussed in relation to particular aspects of the first-line supervisor's job. The final part of the booklet will deal with the implications of the results for management policy.

CONCLUSIONS ON THE SUPERVISOR'S JOB

The studies have demonstrated that the tasks and problems dealt with by production supervisors vary greatly from firm to firm, and that even within a single firm the jobs of supervisors in different sections or departments may be greatly different.

All the supervisors studied were part of the system of control over production; and all were, to some extent, doing each of four things: planning production; checking the production process; dealing with contingencies in production; and reporting back to their supervisors. However the precise nature of these jobs and their relative importance were different in every case; and many other functions which were important in some supervisory jobs were wholly absent in others.

All the supervisors studied (with one exception at Brewing Ltd.) were in charge of a number of operatives; but the amount and type of control which had to be exercised over them varied greatly. At one extreme there were skilled operatives on repetitive jobs, who required little or no instruction or intervention from the supervisor; at the other extreme, there were comparatively untrained operatives moving constantly from job to job, and needing frequent instruction and supervision.

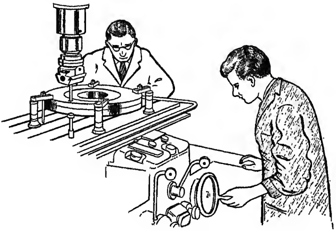
Again, all the supervisors studied were responsible for a certain quantity of machines and equipment; but the amount and type of control varied according to the nature of the production process, the degree of mechanization, the reliability of the plant and other factors. In every case the supervisor was responsible for the whole of the production process within his section and not merely for the operatives who handled it; and he spent most of his time on problems related to the particular technical situation in the department.

WHAT ARE THE MOST IMPORTANT FACTORS AFFECTING SUPERVISORY JOBS?

The studies show that there is no simple relationship between the 'technology' and the nature of the supervisor's job, and that the factors affecting supervision are both numerous and complex. One aim of the research (not yet by any means achieved) is to identify these factors and to measure their incidence in particular cases and their effects on supervisory tasks and behaviour. Among the most important of them are:

(i) *The degree of planned variation in the operations*, i.e. the amount of variation in the actual scheduled tasks (whether operative or mechanized) performed on different batches or products within the supervisor's section. Where this variation was high, the supervisors spent more time on planning, preparing to implement the plan, and allocating or transferring work.*

(ii) *The degree of complexity of the operations supervised.* Where this is high there is more stress on inspection and a more technically biased supervisory system.



(iii) *The degree of mechanization of the process.* Mechanization means, of course, the substitution of machine operations for human operators, and this alone can cause supervisors to concentrate on inspecting machinery and dealing with machine faults and breakdowns as their first responsibility. Mechanization is related to factor (i), but is distinct from it, since it is possible to have, on the one hand, highly mechanized batch production, and on the other, mass production which uses mainly human labour.

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* This factor is related to, but not identical with, the division into unit, batch, mass and process production suggested by Miss Woodward: since in complete mass production the work-tasks remain identical, whereas in unit production they are usually, though not necessarily, diverse.

(iv) *Organization of supervisory systems.* Any one production situation can be organized in various ways. Several types of organization may be equally effective in certain situations, but the type of organization which is chosen by managements will help to determine individual jobs within it. This introduces a whole new range of factors which cannot be discussed here, but one of the most important is the supervisor's span of control, which greatly affects the size of his work-load. However, in view of the number of other factors involved, there is no optimum supervisor-operative ratio applicable to all cases. For instance, a supervisor in charge of 40 operatives in a non-mechanized mass-production firm may have a job comparable in work-load to that of a supervisor in charge of six operatives in either a jobbing shop or a highly mechanized process plant.

It is, of course, possible to have a type of organization which is unsuited to the tasks to be performed; and, in fact, in all the case studies there was evidence that the organization structure needed to be reformed.

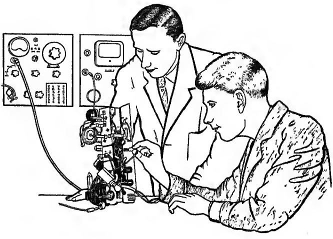
VARIOUS SUPERVISORY FUNCTIONS

The following were among the functions performed by first-line supervisors in the firms studied;

Planning production. The amount of planning by the shop-floor supervisor varied according to the degree of planned variation in the operation in his department or section. (See page 6)

The firm with the greatest operational variability was Engineering Ltd., where a large number of 'lines' was being produced, with frequent changeovers between batches; the tasks were complex, and the 'lines' varied in the number of operations required. The situation was further complicated by rush orders which had to go through at a different speed. Production was planned in detail by the production control department, but variations in the programme and switches in requirements (typical of the industry being served) were very frequently necessary. In these circumstances the supervisor used his local knowledge of tools, components and labour to overcome difficulties, and this involved decisions on how much to produce a day, orders of priorities, etc. In Packaging Ltd. the situation was similar; although in theory a general plan was worked out by higher management, in practice supervisors usually had to re-plan in the light of their knowledge of production capacity.

At the other extreme, at Electronics Ltd., there were no changeovers during the whole period of study. The amount to be produced each day did not vary, and there were no changes in plant nor layout. The amount of day-to-day planning, therefore, was minimal, and could be done by higher management on the basis of past experience. The supervisor's only planning function was the organization of labour when absenteeism was high. Similarly, at Brewing Ltd., although production was in 24-hour batches or cycles, there was no variation in the nature of product nor in the operations to be performed. Production was again planned by non-supervisory management, and the supervisors had only to plan the use of labour.



Footwear Ltd. occupied an intermediate position. Although at any one time a dozen or more different 'lines' were being produced throughout the factory, the amount of operational difference between them varied from department to department.

Thus in four department rooms there were very few operational variations, so that the situation, from the operatives' point of view, resembled 'mass production'. A production control department was able to prepare, three days in advance, a day-sheet showing the number of shoes of particular types to be processed, the order of production, and the type of last required; and supervisors were able to adhere to this without difficulty. In the remaining two departments there was much greater variation of operations between different 'lines'. The planning department produced a day-sheet for these departments also, but with considerable assistance from the shop-floor supervisor, who decided the actual order on the day of production. Supervisors were again able to adhere to the planned schedule, because it was flexible and allowed them enough time to deal with contingencies.

Planning the use of labour was common to all supervisory systems studied (with the possible exception of one department with a small and constant labour force). At some firms it only became a problem when absenteeism was high or where special tests were being performed, but in the small-batch firms it was a serious problem occupying much of the supervisor's time. At Packaging Ltd., the size of the work-team varied according to the line being produced, and operatives were frequently transferred from group to group.

Preparing for implementation of plan. Here again the supervisor's work-load increased with the variability in shop-floor operations. For instance at Engineering Ltd., where the variation was highest, machines had to be adapted, and tools and components had to be acquired before a new batch could be put into operation; and in many cases operatives had to be retrained, either because they had been moved to a job that was unfamiliar to them, or because the 'line' was new to the department. In the closing room at Footwear Ltd. where there was rather less variation in tasks, it was still necessary to adapt machinery and retrain operatives whenever a new 'line' was introduced. Mass production firms, however, had no such problems. In Electronics Ltd., the only preparatory job was to ensure the arrival of components, and this did not usually present serious problems. In Brewing Ltd., the process supervisors had no preparatory work.

Routine distribution and transfer of work. At only three firms did supervisors allocate work regularly to individual operatives (as distinct from special allocations caused by absenteeism etc.). At Electronics Ltd. operatives went on with their jobs, and organized rota schemes for changing jobs round at regular intervals without instructions from the supervisor. In the 'closing' room of Footwear Ltd., the complicated process of transferring batches of work between operations was organized by the operatives themselves, with occasional assistance from the supervisor when work was delayed or when 'bottlenecks' were forming. At Brewing Ltd. the process supervisors spent a large part of their time transferring the product between vessels, e.g. by turning valves.

Performing operative functions. At two firms, where status differences tended to be less than in the other two firms, supervisors frequently helped operatives with their work. At the other firms supervisors never did so, even when the absentee problem was serious.

Supervising operatives at work. Direct supervision of operatives (that is, standing over them and watching them work) took up a significant part of the supervisor's time at only two firms—where there were frequent changes in operations—though even there the time spent on direct supervision never exceeded 8 per cent of a supervisor's working hours. Where skilled workers were employed or where operations did not change, the amount of direct supervision was very small indeed, and it was clear from interviews that it would have been resented by the operatives. At Brewing Ltd. the simplicity of the work performed by operatives (mainly cleaning of vessels) made frequent supervision unnecessary.

Checking the product. Inspection of the product after the operation appeared in most cases to be a more important method of control than direct supervision of workers. At three firms, the main purpose of this inspection was to check on operative performances; though at Engineering Ltd. it also served as a further check on the quality of materials. In Department Y at Electronics Ltd.* the main purpose of inspection by supervisors was to check on the performance of the inspectors, who formed a large part of the departmental labour force, and to ensure that the right standards of acceptance and rejection were being maintained. In this department supervisors also performed special electrical tests on the product after processing; and similar process tests were applied at Brewing Ltd. At two firms supervisors also checked *with* the inspectors in order to guide and help them with their work when the quality of materials was suspect.

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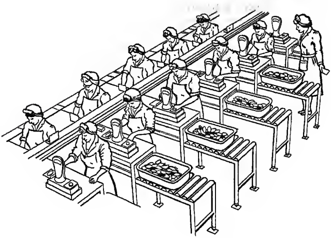
*At Electronics Ltd. two departments were studied. They were at different stages of the process, and, although the organization of supervision was similar, there were marked differences in supervisory functions between them. They will be referred to as Departments X and Y.



Checking the machinery. A further task which occupied a large amount of the supervisor's time was the inspection of machinery, or of the product while it was being processed by mechanical means. This was most important where there was complex machinery; but the most notable instance was in Department X at Electronics Ltd., where first-line supervisors spent on average 16 per cent of their time, second-line supervisors 17 per cent of their time, and the department head 7 per cent of his time inspecting a single one of the semi-automatic machines. This machine was at the start of the production line, so no element of operative performance checking was involved. It was claimed that the settings on the machine were subject to fine tolerances and yet could not be exactly measured, so that constant inspection was necessary. In fact, however, individual supervisors varied greatly in the amount of time spent watching the machine without any observable effect on the production or efficiency figures per shift-unit during the period of study.

Dealing with contingencies, or unforeseen deviations from the planned schedule after it has been put into operation, was in every case a major part of the supervisor's job, although the type, frequency and importance of the contingencies and the counter-measures taken by the supervisor varied greatly. Broadly speaking, these contingencies can be divided into those whose main cause was *technical* (i.e. those which could be remedied only by a change in the technical situation) and those whose main cause was *human* and which could only be remedied by 'human relations' methods.

The most important types of *technical* contingencies were:

(i) Variations in product or raw material.
(ii) Shortages of raw material.
(iii) Faults or breakdowns of machines or plant.
(iv) Shortages and variations of tools and equipment.
(v) Shortage of space.

Of these (i) and (iii) occurred frequently in all the firms studied, the others in some firms only.

Unplanned variations in the product or raw materials, due to factors beyond the supervisor's control, frequently occurred before entry into the supervisor's section, but were only discovered in the course of the process. They were especially important where the product was technically complex or had already undergone a large number of operations or processes. In Brewing Ltd. unplanned variations in the behaviour of the product caused vessels to overflow and gave rise to much manual work and emergency measures by first-line supervisors. In Electronics Ltd. (perhaps owing to the complexity of the product) the main responsibility for isolating and eliminating these variations belonged to second-line supervisors, who conducted special tests and kept in touch with the previous department where variations were thought to arise.

Shortages of raw materials were a problem principally at the small-batch firms where components varied from batch to batch and came direct from a very large number of suppliers. At

Packaging Ltd., in particular, shortages often necessitated drastic replanning at short notice.

Variations or breakdowns in the machinery or plant caused problems for nearly all the supervisors studied, but the extent of these problems varied according to the complexity and degree of specialization of the machinery. Thus, at Engineering Ltd., where machinery was frequently adapted to deal with new 'lines' of work, faults and breakdowns often occurred, and supervisors spent a large part of their time on minor alterations to machinery, in consultation with maintenance departments, and on inspection and repair of products that had been processed on faulty machines. At Electronics Ltd. the machinery was more specialized and faults could be more easily anticipated and prevented; faults were less frequent than in the small-batch firms but, when they did arise, had more serious long-term effects; in this case the rectification of machine faults was normally beyond the supervisor's powers, but he had to make the decision when to stop and empty out a machine and to obtain help from maintenance departments. At Brewing Ltd. major breakdowns were rare, but there was a surprisingly large number of minor faults, which had to be corrected by manual work on the part of the supervisor. Difficulties in obtaining maintenance personnel often meant that the supervisor was obliged to 'make do' with faulty machinery.

The inadequacy of the departmental layout also affected many supervisors' jobs. In some cases, shortage of space meant that the supervisor spent much time clearing the gangways of spares, trolleys etc. In other cases, awkward layout meant that much time was wasted running up and down stairs and covering large areas of ground.

Absenteeism (including all causes of 'shortage of labour', such as holidays, lateness, refusal to work overtime etc.) was the only major 'human' contingency common to all firms studied. In several firms it caused serious setbacks to production and increased the supervisor's work-load. The effect of absenteeism was lessened when there were a large number of replacement operatives, or when, as at Brewing Ltd., the operatives played a comparatively minor role in the working of the process.

Disputes and disciplinary matters can also be grouped under 'human contingencies', but neither of these took up a large amount of supervisors' time. The one exception was Engineering

Ltd., where occasional disputes arose between unions and management, in which supervisors were involved. In these few cases, the first-line supervisor arranged for the shop steward to discuss the matter with a member of middle management.

At other firms there were occasional examples of supervisors who felt that discipline was a problem; or of operatives who resented individual supervisors; but, despite this, there was no evidence that supervisors (outside Engineering Ltd.) were having difficulty solving such 'human relations' problems, or that these problems were occupying an appreciable part of their time.

Personnel matters (apart from those already covered). Supervisors were nominally responsible with the Personnel Department for selection and training in most of the firms studied; but these duties took up very little of their time. Only in one department were supervisors observed giving initial training to operatives. In other cases, operatives were either instructed in a training department away from production or, where the jobs were simpler, the training was carried out by 'sitting next to Nellie'.

Working out piece rates and bonus rates was an important function for supervisors at two of the firms. Occasional consultation with shop stewards over minor issues took place in three out of the five firms. In one of the remaining firms, unions were not recognized, in the other stewards went direct to the management.

Most supervisors regarded the operatives' personal problems and general welfare as one of their main concerns; but in fact this was a 'low priority' matter, and the amount of time spent on it decreased as the pressure of other jobs increased.

Acting as a communication link. The study did not confirm the common idea that a vital part of the supervisor's job is the passing of information to operatives. First-line supervisors were usually as badly informed as were the operatives themselves on the reasons for changes. In those firms where there was little or no planned variation in operations, operatives knew their jobs and needed very few instructions. Where there were considerable variations, the supervisors made most of the detailed decisions on production planning without consulting management.

In Packaging Ltd. (a non-union firm) supervisors spoke on behalf of the operatives in arguments with management, particularly over incentive bonus. This was the only case in which supervisors frequently acted as a communication link upwards from operatives to management.

Nearly all supervisors studied were expected to report regularly to management on the production situation, either orally or on paper. Written records and reports seemed to be particularly important where production was uniform, i.e. where planning was mainly done by higher management. In Department X at Electronics Ltd. 'reporting back' to management was possibly the most important function fulfilled by first-line supervisors; and at Brewing Ltd. contact between management and foremen was maintained almost entirely by means of written records and reports.

The amount of cross-contacts made by supervisors also varied greatly. To give an example, at Department X at Electronics Ltd. first-line supervisors had very few cross-contacts except with maintenance; whereas in Department Y, foremen had frequent contacts with each other, with the preceding and following production departments, and with technical personnel on various production problems.

THE BEHAVIOUR OF SUPERVISORS ON THE JOB

Given the variation in functions discussed above, how far did the daily activities of supervisors vary?

In each case-study the activities of groups of first-line supervisors were studied by means of work-sampling, i.e. by a series of snap observations at random times over a period of two to four weeks. (See details in Appendix I)

Figure 1 shows the activities of groups of first-line supervisors at four firms* as observed by this method. At each, the total number of first-line supervisors has been split into two contrasting groups, and each circle represents the average working day (including break periods) of one of these groups. Activities have been divided into the following categories: communication, paper work, 'stand and supervise' (i.e. closely overlooking an operative's work), inspection, responsible (non-operative) manual work, ordinary manual work, 'no apparent activity' and personal time, break (including lunch, tea and unofficial breaks), and 'not seen on tour' (i.e. presumed to be outside production area covered by observer's tour).

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*Engineering Ltd. has been omitted as the number of observations was not large enough to make the figures reliable.

Detailed comment on these figures is outside the scope of this booklet. Nevertheless, the diagrams emphasize once again the large variation in supervisory activities, not only between firms, but also between different departments in the same firm. As each circle represents an 'average' of the activity patterns of a number of supervisors, the differences cannot be ascribed to individual personality factors.

Communication is in most cases the dominant activity in terms of time, but this is a wide category including three basic types:

(i) Acting as a link between management and operatives (discussed as a function of supervision on page 15).

(ii) Communicating as a means of carrying out other functions, e.g. discussing, instructing, receiving requests etc., with other supervisors or subordinates on activities going on within the section.

(iii) Personal conversation.

In most cases, the second type of communication occupied the most time.

The large amount of manual work done by supervisors (more than 8 per cent in six cases out of eight) should be emphasized. Many of the other categories are extremely diverse: for instance, the type and purpose of the 'inspection' performed by supervisors is very different in different firms.

MANAGEMENT'S INFLUENCE ON SUPERVISORS

The behaviour of supervisors then, is influenced to a great extent by the type of production situation in which they work. Yet this does not mean that this is the only factor influencing behaviour, or that there is no room for training in styles of doing the job. The behaviour of the groups of supervisors whose activities are shown in Figure 1 is the outcome not only of their technical environment but also of their training and of the influence of management practice.

Figure 1. Activity patterns of first-line supervisors
(Percentage of total working hours)
(Figures in brackets refer to number of supervisors covered)

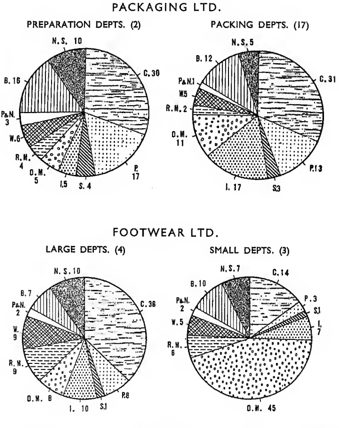
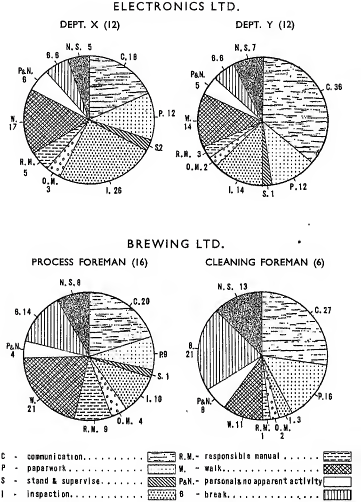


Figure I (continued)


ELECTRONICS LTD.

DEPT. X (12)

DEPT. Y (12)

BREWING LTD.

PROCESS FOREMAN (16)

CLEANING FOREMAN (6)

The following case-study provides some evidence of the effect of variations in management practice and outlook on supervisory behaviour and also of the effect of variations in supervisory behaviour on inspection ratios in the department.

> In Department Y at Electronics Ltd., it was possible to study three rotating shifts, each with a shift head and four foremen, and with a very different 'management approach'. The technical situation and the formal organization were the same on all three shifts. The department head (on days) was 'permissive' in outlook, and allowed his three shift heads (or second-line supervisors) to run their shifts in different ways. These three men were very different in personality and outlook, and instilled a very different 'philosophy of supervision' into their subordinates (the unit foremen or first-line supervisors).
>
> The shift heads also had considerable (unofficial) power over the selection of supervisors for their own shift. Shift head A was essentially paternalistic and authoritarian; he chose his foremen from the shop-floor, 'trained them up' to behave in particular ways (e.g. to spend much of their time 'patrolling the unit') and imposed strict standards of discipline. Shift head B (a qualified engineer) spent more time than the other shift heads in the actual production area and worked in closer co-operation with the foremen. Shift head C was himself 'permissive', believed in and practised maximum delegation to foremen and let them 'learn by their own mistakes'. On both B and C shifts a majority of foremen had been brought in from outside with technical qualifications. Simplifying the situation very considerably, shifts A, B, and C can be classified as the 'autocratic', 'consultative' and 'permissive' shifts respectively.*

Figure 2 shows the activity patterns of the 'average' foreman on each of the three shifts. It will be seen that the behaviour of foremen on different shifts in the same

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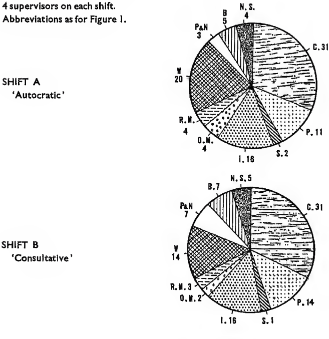
*This is not an attempt to argue the respective merits of different 'styles' of supervision but only to point out that there was a difference in outlook among the three shifts corresponding to the difference in the foremen's behaviour.

Figure 2. ELECTRONICS LTD.

Department Y

Activity patterns of first-line supervisors on three shifts
(Percentages of total working hours)

4 supervisors on each shift.
Abbreviations as for Figure 1.



department, was much more similar than that of foremen in different departments and firms as shown in Figure 1. Thus the technical situation does have a marked influence on behaviour. Yet there are certain differences between the three shifts. More time was spent in communication on shift C, more time 'walking' on shift A. Similarly, the location figures for the three sets of foremen show that shift C foremen spent more than twice as much time in the foremen's office as shift A foremen, and that shift B foremen spent more time in a particular area of the unit. Contact figures show that shift C foremen had the most contact both with the operatives and with each other; that shift A foremen spent most time in isolation.

In this situation at least, the behaviour of foremen could be influenced by different methods of selection and training. It would, however, be wrong to generalize from this to all industrial situations. The firm as explained above (pages 11 and 12), was a mass-production firm in which foremen had few planning responsibilities, and their most important job was to inspect for contingencies and to deal with them when they arose. In this department contingencies were not especially frequent, and for much of the time foremen were 'waiting for something to go wrong'. Differences between shifts may be mainly differences in the way that foremen performed their less essential duties.

Did the differences in supervisory behaviour in this department have any effect on the efficiency of production during the period of the research? Since the supervisors (here as elsewhere) inspected the product and frequently made their own decisions on acceptance or rejection, it might be expected that the amount of time spent on inspection by foremen would affect the percentage of products rejected in his section. Much of the work was inspection, and supervisors, when performing inspection themselves, were checking the inspectors' work rather than that of the process operatives. Rejection rates were worked out daily per shift-unit (i.e. per foreman's section), and the average rejection rate per shift-unit over the period of the work-sampling study is compared in

Figure 3.

ELECTRONIC LTD.

Department Y

Time spent on inspection by supervisors compared with percentage of products rejected in supervisor's section

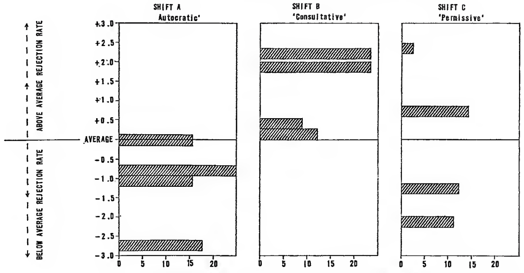


Figure 3, with the percentage of time spent by individual foremen on inspection.

The main points that emerge are:

(i) Shift B had a consistently higher rejection rate than shift A; shift C (the 'permissive' shift), was more erratic.

(ii) On shift B, the rejection rate tended to be highest when the foremen did most inspection. This was not true on the other shifts.

The most plausible explanation is that the different points of view of the three shift heads were passed down to their respective foremen. Shift head B, being more technically minded, believed in the rigid application of quality standards; therefore, the purpose of inspection of the product by supervisors in this shift was to reject borderline cases which had been passed by the inspectors. (This was confirmed by interviews with foremen on this shift.) On shift A, on the other hand, the purpose of inspection by supervisors was to raise the efficiency rate by preventing inspectors from rejecting too many items. On shift C (the 'permissive' shift) each foreman followed his own inclinations on inspection standards, hence the greater variability of efficiency rates on this shift. In other words, not only the behaviour, but also the *aims* of supervisors, differed from case to case.

This example therefore shows that the behaviour of supervisors, and through it the efficiency of the department, can be influenced by training; but it also raises in acute form the problem of the *purpose* of a supervisory system, and of finding criteria by which to judge supervisory efficiency.

II. IMPLICATIONS FOR MANAGERS

A PROGRAMME FOR ACTION

In order to organize a supervisory system, and to select, train and promote supervisors, management must know what functions supervisors are performing. The study has revealed differences in the functions of supervisors not only between firms but also between individuals and jobs in the same firm. These variations are so great and the factors influencing them so complex, that managers cannot assume that they have an intimate knowledge of these functions, either on a basis of prediction from experience or even by a consideration of existing job specifications which may bear little relation to the facts. There is no substitute for the direct observation of each supervisory job.

Assuming, then, that management wishes to gear the organization, selection and training of supervisors directly to the tasks performed, five steps seem to be necessary:

(1) *Clarify* the assumptions and aims of the existing policy.

(2) *Investigate* existing supervisory functions.

(3) *Compare* the assumptions of (1) with the facts revealed by (2).

(4) *Inquire* into the nature and causes of specific problems revealed by (3).

(5) *Formulate* the most economic solutions to these problems.

(1) *Clarify existing assumptions and aims.* Before re-thinking policy, it is necessary to be clear on the assumptions which lie behind the present system. What are the reasons for the existing supervisory organization (number of levels, span of control etc.)? What functions are supervisors (explicitly or implicitly) expected to perform? What are the present criteria for selecting and promoting supervisors? What are the goals of the existing programme of supervisory training?

(2) *Investigate the daily pattern of work problems in supervisory jobs.* Senior and even middle management easily build up stereotyped pictures of a supervisor's role, which may have little

bearing on actual shop-floor problems. In most of the firms studied, communication links between supervisors and managers were tenuous. Pressure of office work, frequent meetings and the essential mobility of managers, all tend to prevent close contact between supervisors and higher management; and a rotating shift system increases the isolation of supervisors still further.

Managers, therefore, need to collect more information about supervisory problems in a systematic way; especially in view of the immense complexity and variety of supervisory work. There are now a number of techniques for doing this—with varying degrees of reliability. Diaries by observers, activity sampling, interviews following sample observations, and self-recordings, are all possible methods which could be used by managements.*

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*See Appendix I.

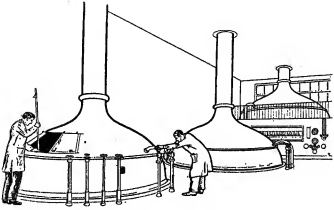
Once the normal pattern of activity at each level of supervision is established, it is then possible to specify the nature of the control which is being exercised by the 'system of supervision' over the manufacturing process.

(3) *Compare assumptions with facts.* Having discovered the functions actually performed by supervisors, managers can compare these with their own assumptions and aims (as classified in stage (1)). From this comparison they can locate specific problems which require action.

(4) *Inquiry into specific problems.* Managers should then be able to reconsider their policy of delegation of duties, organization, selection and training, with the aim of identifying the reasons for specific problems and of solving them in the interests of maximum efficiency and morale. Why are supervisors behaving in these particular ways? Could they behave more effectively, given the existing organization? Or is the organization itself at fault? If so, is it because of any defect in formal or laid down policy or in any policy *implied* in managers' behaviour? This re-examination of policy should go beyond the formal procedures and aims of management and include the attitudes of managers towards supervisors, the amount of communication between them, and so on.

A discrepancy between supervisors' behaviour and management's aims would 'for example' be found if supervisors were doing a large amount of manual work on machines, and this conflicted with management's policy that supervisors should never work with their hands. It would then have to be decided whether the fault lay with the supervisors themselves (and could therefore be remedied by training), or whether it lay in the attitudes of management and could best be solved by an alteration of policy or organization or delegation of duties. It would be unwise to order supervisors to refrain from manual work without first inquiring into the possible technical or organizational reasons for their behaviour (for instance, inadequate machinery, shortage of operatives or of maintenance staff, or production variations). The behaviour of supervisors is to a large extent determined by the demands of the production process and the management's aim should be to help them to meet those demands rather than to direct their behaviour according to a preconceived policy. If management's aims and expectations are in direct opposition to the demands of the process, a genuine situation of conflict will arise and the difficulties of the supervisor's job will increase considerably.

(5) *Formulate solutions.* Having inquired into the nature and causes of problems, managers can then determine the changes which are required and the most economical method of achieving these changes.



QUESTIONS TO CONSIDER

The remaining section of the booklet consists of a number of questions which managements would find useful to ask when investigating and solving problems revealed by observations (stages 4 and 5). These will be divided into questions on delegation, organization, selection and training, but these areas do, of course, overlap and cannot in practice be considered separately.

DELEGATION OF DUTIES

(1) *Are there any functions now being performed by supervisors which would be best dealt with by other methods?*

In any given situation, managers have a choice of methods in controlling their production process. If, for example, a mass production line has a severe problem caused by operatives who vary their methods of work, this could be dealt with by:

(i) Intensive training for operators in an operative training school.
(ii) More direct supervision by supervisors (perhaps an increase in the number of supervisors).
(iii) Further automation in the plant, reducing the amount of discretion open to operators, e.g. by making a machine operate on automatic control.
(iv) More inspection of an article after the process by:
    (a) special inspectors
    (b) supervisors
    (c) mechanical tests.

Control is exercised through the supervisory system only in (ii) and (iv, b). Non-supervisory control by, say, an automatic machine control system, may be more dependable, but will probably cost much more than an expanded supervisory system.

Further possible solutions might lie in building up the operatives' knowledge and understanding of standards, and their willingness to accept responsibility for standards, so that a wider range of decisions could be left to them.

(2) *Are there any functions which should be performed by supervisors which are not now part of their normal work?*

For instance, if it is found that production line supervisors do not negotiate or even consult with shop stewards, but that union matters are dealt with by higher management, this could be due to the system of delegation rather than to any personal weakness of supervisors. How far should dealing with union matters be concentrated among specialist personnel, rather than among the line supervision on the shop-floor?

Or it might be decided that supervisors should spend more time dealing with methods improvements in the interests of productivity. How far should managers delegate this to supervisors as a normal part of their work?

ORGANIZATION OF THE SUPERVISORY SYSTEM

(1) *Is the supervisory organization based on the actual tasks which have to be performed?*

Too many organizations are designed either on traditional lines, e.g. one foreman for each group of craftsmen, or according to abstract principles, e.g. 'span of control', without reference to the tasks performed.

(2) *Is the organization sufficiently flexible to allow for contingencies?*

Even in mass production or on long runs where duties can be formalized to a great extent, contingencies do occur and the organization must be flexible enough to cope with unforeseen problems.

(3) *Is the organization up to date?*

As the tasks of supervisors are affected by technical and other types of change, the structure of the organization must be constantly reviewed.

In all the case-studies there was evidence (see page 8) that the structure had been originally devised to fit a different technical situation, and needed to be adapted in the face of changes. Duties needed to be redefined, and the number of supervisors increased or lessened.

(4) *Does the organization encourage the free flow of information between supervisors and functional departments?*

There is a continual need for management to know and appreciate the details of the shop-floor situation, and for supervisors to be kept aware of management decisions.

(5) *Does the organization allow sufficient contact between supervisors and functional departments?*

The line and staff type organization presents very great difficulties for supervision. It is a possible solution to make functional specialists responsible to supervisors in certain situations.

SELECTION AND PROMOTION OF SUPERVISORS

(1) *What qualities are needed by supervisors in a particular situation?*

The diversity of supervisory roles means that different qualities are required in different cases, and one cannot lay down universally applicable selection criteria. For instance, high intelligence may be of little importance in some cases, but highly important in others (for example, where the supervisor has major planning responsibilities; when there are frequent changes and developments; or where the job requires a detailed understanding of complex plant). Also, a supervisor may often have to cope with a large number of problems coming 'at' him in quick succession.

There was no evidence from the research that the successful supervisor should possess particular personality traits. On the contrary, in many cases supervisors with contrasting characteristics were equally associated with good morale and high productivity sections. In these cases operatives appeared to have formulated their conception of 'the good supervisor' to fit in with the characteristics of the man above them. The only exceptions were certain cases where supervisors showed extremely aggressive or inflexible attitudes.

In general, it is very easy to overstate the qualities required for a 'good' supervisor. To judge from job specifications, some managers seem to be looking for a kind of 'superman' combining advanced technical qualifications with exceptional social skills. In reality the successful supervisor will probably possess more modest abilities.

(2) *What types of knowledge and/or experience are required?*

Here again no complete generalizations are possible. In some cases theoretical knowledge will clearly be an asset, especially where there is rapid technical change. Yet the technical bias of the supervisors' job means that experience as an operative in the department is of great advantage to him. The supervisor needs to have a detailed knowledge of the behaviour of machines and materials in the department, as well as of the informal working of the organization. Technical knowledge of process behaviour may often be unrelated to specific technical qualifications. If one wishes to use qualifications as a criterion for selection (which is often demanded at the moment), great care must be taken in examining the precise relevance of particular qualifications to the technical knowledge required on the supervisor's job. In many cases no genuinely relevant qualifications exist.

TRAINING OF SUPERVISORS

(1) *What should be the aims of supervisory training in particular cases?*

Supervisory training has unfortunately suffered in the past from a lack of clear definition of aims. Speaking generally, 'supervisory training' can be defined as any type of activity designed to achieve one or more of the following objectives:

(i) to improve the supervisor's performance at his present job;

(ii) to improve his ability to adapt to technical and other changes that will affect his job;
(iii) to fit him for promotion to higher management (or for transfer to other jobs);
(iv) to assist his 'general development' in ways not directly related to the job or to specific promotion.

Some of these aims may be inappropriate in particular instances. For example, if changes are not anticipated, objective (ii) will be inappropriate; if no supervisors are likely to be promoted or transferred objective (iii) will be ruled out. There is no need to train for objective (i) unless there are specific reasons for believing that a supervisor's job performance *can* be improved by training.

It is nevertheless important to be clear on the precise aim or aims which are intended, the precise improvements in performance or potential which are hoped for, and the justification for expenditure in order to obtain those improvements.

A very large part of the training now given by industry and independent bodies is aimed at objective (iv)—the supervisor's 'general development'. This, though an important form of training, should not be done at the expense of other more job-centred types of training which have often been neglected in the past.

(2) *What types of supervisory deficiencies can be met by training?*

The first step in the training process is to set out to identify deficiencies in the present or future performance of supervisors (i.e. training requirements) which can be remedied by deliberate acts of training. How are these needs to be identified?

Deficiencies in supervisors' present performance can only be discovered by means of careful observation of supervisors at work, as recommended above. For instance, it might be discovered that supervisors needed training in the preparation of reports of shop-floor production data to higher management; or in how to plan and programme their own day's work; or in how to take a particular machine apart.

Deficiencies in *future* performance arising from anticipated changes may be more difficult to identify, but the diagnosis should still be based on a detailed knowledge of the supervisor's present functions. Without this knowledge, it would be difficult to know how far his job would be affected by the introduction of a new machine or product, or of a new method of payment.

If the aim is the promotion or transfer of supervisors, it is still necessary to study present performance in order to develop training based on their personal requirements.

(3) *Given the 'training needs', what 'level' of training (knowledge, skills or attitudes) is appropriate?*

Training can be at any of three 'levels':

(i) the imparting of factual information (knowledge);
(ii) the development of skills or techniques of work;
(iii) the encouragement of certain ways of thinking or behaving (attitudes to work and people) appropriate to the job.

The relationship of these 'levels' to the 'objects of training' described above is shown in Figure 4, in which various subjects of

Figure 4. Classification types of supervisory training

OBJECTIVES OF TRAINING:	KNOWLEDGE (a) directly relevant to work	KNOWLEDGE (b) indirectly relevant to work	SKILLS	ATTITUDES
Present job	Job knowledge	Peripheral knowledge e.g. industrial law, work study	Skills of supervision appropriate to job	Attitudes appropriate to job as it exists
Present job adapted to change	Knowledge of technical and other developments	General technical knowledge; knowledge of the industry and of organizational theory	Skills of adaptation to change	Attitudes appropriate to change and expansion
Promotion or transfer to specific job	Knowledge of specific management procedures	Knowledge of management theory, history of industry, etc.	Skills of management appropriate to job	Management attitude and outlook appropriate to job
General development		General knowledge, e.g. English, Maths.	General management and supervisory skills	Management attitudes and outlook

training are placed under their appropriate 'object' and 'level'. Each of these 'subjects' (e.g. 'job knowledge') includes a large number of possible 'training requirements'.

The most effective techniques of training at one 'level' may be quite different from those at another 'level', and it is important to determine at which 'level' the principal deficiencies lie. For example, suppose that a firm wishes to improve the performance of its supervisors in carrying out certain administrative procedures. Is the principal aim to improve their *knowledge* of the procedures themselves? Or is it to increase their skill in, say, calculation or the use of English? Or is it rather to change their *attitudes*, for instance by impressing on them the importance of correct records? The type of training should vary according to the 'level' of the deficiency which is being remedied.

(4) *What are the most effective methods of organizing training?*

Supervisory training methods now available can be grouped as follows:

1. *Off-the-job training:*
   (i) Formal lectures and talks by experts.
   (ii) Discussion periods among groups of supervisors.
   (iii) Group and individual exercises and projects.
2. *On-the-job training:*
   (i) Individual experience, 'acting up' in a new job.
   (ii) Individual tuition by a superior or another supervisor.
   (iii) Group discussions among departmental supervisors and their superior or manager about actual job problems (so-called 'vertical training').

The choice of method must be related to the ends of training as discussed above. For each subject of training (see Figure 4) a variety of methods can be used—a course designed to change 'attitudes on the job' could take the form of a simple lecture on the need for sympathy and understanding, or of a 'group dynamics' discussion designed to change the supervisor's whole conception of his job. The choice will depend on the precise nature of the 'training requirement'.

When the aim is to improve job performance the dependence of the supervisor's job on the actual shop-floor situation places severe limitations on the relevance of off-the-job training. Training on the job, whether administered by formal instruction or continuous informal advice and example by the supervisor's superiors, is clearly more effective. The case-study at Electronics Ltd. (see pages 20–24) showed the effect of training by second-line supervisors on first-line supervisors' behaviour, and showed also that, due to a lack of a clearly defined management training policy, the three shift heads had different training aims. There is a need for training departments to improve on-the-job training through co-operation and discussion with department heads and senior supervisors; this activity may be more important than the organization of training courses off the job.

When the aim is to train for future performance or for specific promotion or transfer—objectives (ii) and (iii)—training may again be more relevant and effective if conducted within the factory where changes are to take place.

On the other hand, training for the supervisor's 'general development'—objective (iv)—may require the more open atmosphere of the college or residential training centre where established opinions can be questioned and discussed.

(5) *Is it possible to have a common training programme for supervisors or should each supervisor be trained differently?*

The diversity of supervisory roles makes a common training programme in 'supervision' an elusive target. The best-known scheme of training of supervisors on a national scale is 'Training Within Industry' (T.W.I.).* It is asserted under this scheme that the supervisor's job can be divided into six parts: skill in handling people; skill in instructing; skill in improving methods; skill in making work safe; knowledge of responsibilities; and knowledge of work. The first four of these are dealt with by the T.W.I. programme (job relations, job instruction, job methods and job safety) as they are said to bo common to all supervisory situations. The last two are said to vary with the firm, and can only, therefore, be taught within the firm.

This programme is often irrelevant to the training requirements discussed above. In the five firms studied, skill in instructing was important to supervisors only in one department at one firm. Skill in improving methods was not a significant part of the supervisory function at any of the firms, and supervisors were not observed to be undertaking any special safety inspections or giving instructions on safe methods of work. It can be argued

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*See *The Training of the Supervisor*, Ministry of Labour Committee Report 1953.

that they should have been instructing, improving methods and watching safety, but considerable changes in organization structure and management behaviour would be necessary to bring this about. More surprisingly, it was only in a small minority of cases that supervisory skill in 'handling their operatives' or skill in dealing with other managerial staff seemed to have been a real training need. The evidence from these studies suggests that only a minority of supervisors may be called upon to exercise so-called 'leadership skills' in their daily work.

The difficulty lies in the concept of 'common skills of supervision'. The evidence from this research suggests that these common skills exist only at a very superficial level and that effective training of supervisors must be concerned with more detailed and specific skills. Probably such skills can only be analysed and 'trained for' within a company or plant.

(6) *How can expenditure on particular acts of training be justified?*

When the aim of training is to improve job performance, it should be possible to select specific criteria to measure performance so that the effect of training can be evaluated. Once the criteria have been decided, management may be able to calculate the saving resulting from improvements and to set these off against the cost of training, bearing in mind that other factors may influence the outcome.

It is more difficult to measure the effectiveness of training for more long-term ends, and in particular for training which is aimed at 'general development' of the supervisor. Yet even here it is usually expected that the supervisor's job performance or suitability for promotion will benefit from the training and, if so, it is still important to be clear what precise improvements are hoped for.

The evaluation of training in economic terms is not an easy task, yet it must be attempted, since it forces management to see training in terms of the general aims of the enterprise.

CONCLUSION

Supervision can be made more effective only if the requirements of the job are re-examined, selection methods are improved and training is developed to meet specific deficiencies and aims. These improvements are impossible without detailed knowledge and understanding of the supervisor's functions and behaviour; the *whole* system of supervision should be considered, not merely each individual supervisor, and must be seen in the context of the actual production situation. To obtain this knowledge more precise techniques of measuring and classifying supervisory functions are needed, and work on this is now in progress. But these techniques in themselves can have no practical effect unless managers are prepared to examine the validity of their beliefs about supervision and the relevance of existing supervisory structure to its role in the production process.

APPENDIX I

METHODS USED IN THE SURVEY

In each of the case-studies several methods were used:

(i) *Work sampling*. Frequent tours of the departments were made at random intervals over a period of from two to six weeks, and the route followed by the observer was also selected randomly. On each tour the activity, location and contacts (if any) of the supervisors under study and of those managers and specialists who were in regular contact with them were recorded by 'snap readings' at the moment on initial observation. The number of tours in each firm ranged from 250 to 500. It was possible by this method to build up a statistical picture of the percentage of time spent by supervisors on different aspects of the job during the period of the study. The effects of the observer's presence on the supervisors' behaviour were virtually eliminated by the use of the 'snap observations' technique.

The main defect of the method[*] is that only the immediately observable activities (e.g. 'inspecting machine') and not the true 'function' or purpose of the activity (e.g. 'dealing with machine breakdown') can be recorded. The LSE team is now developing a technique of standard-interval sampling combined with continuous observation by which it is hoped to solve this problem.[†]

(ii) *Continuous observer diaries* of the activities, locations and contacts of individual supervisors covering the whole of a single day or shift. The aim was to obtain a picture of the timetable of the supervisor's day and the amount of consecutive time spent on particular duties.[‡]

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[*] See: Heiland, R. E. and Richardson, W. J., *Work Sampling*, McGraw Hill, New York, 1957.

[†] Hans Wirdenius, *Supervisors at Work*, Swedish Council for Personnel Administration, Stockholm, 1958, has developed a technique of snap observations followed by interviews, but this gives rise to several problems of bias and it was felt that it could not be applied within the present study.

[‡] The method was described in Walker, C. R., Guest, R. H. and Turner, A. N., *The Foreman on the Assembly Line*, Harvard University Press, 1956.

(iii) *Questionnaires* for the supervisors under study, including questions on perception of duties, amount of authority, experience, and attitudes. Nearly all questions were open-ended, and supervisors were called subsequently to an interview at which they expanded and commented on their replies.

(iv) *Interviews for managers and operatives* on their perceptions of the supervisor's job and on the extent to which their own jobs impinged on the supervisory system.

(v) *Use of factory records*, e.g. personnel statistics, labour turnover and absenteeism, and where possible, production and efficiency figures covering the period of the work sampling study.

APPENDIX II

1. DETAILS OF FIRMS STUDIED

	PACKAGING LTD.	ENGINEERING LTD.	FOOTWEAR LTD.	BREWING LTD.	ELECTRONICS LTD.
Type of industry	Packing of small consumer articles	Heavy engineering	Shoes	Brewing	Electronics
'Technology' or production system	Small batch	Small batch	Small/large batch	Process batch	Mass production
Region	S. East	Midlands	S. East	S. East	N. West
Total no. of possible products or lines	Several hundred	Indefinitely large	Indefinitely large	One	Three
Frequency of changeover per section	Every 1–2 hours	Every few hours or less	None. (12 lines simultaneously produced)	None	None (lines simultaneously produced)
Union situation	Non-union firm	Strong and aggressive	Strong but co-operative	Strong, and normally co-operative	Not very strong

2. DETAILS OF DEPARTMENTS STUDIED

	PACKAGING LTD.	ENGINEERING LTD.	FOOTWEAR LTD.	BREWING LTD.	ELECTRONICS LTD.
No. of departments studied	6	1	6	1	2
Shift organization of departments	Days	Days and nights	Days	4 shifts (continuous rotation) and days	3 rotating shifts
No. of levels of supervision in each department	2–3	3	1	1	2–3
Total no. of supervisors studied	43	14	7	22	51
No. of 'first-line' supervisors studied	18	11	7	22	24
No. and sex of operatives in departments (approx.)	16 M 232 F	440 M	42 M 88 F	110 M	370 M
Span of control of 'first-line' supervisors (range)	3–25	10–40	3–30	0–8 (shifts) 0–48 (days)	15–17

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